Lidar Point Cloud on AWS

The USGS 3D Elevation Program (3DEP) is making available a growing subset of it's Lidar Point Cloud data through an Amazon Web Services (AWS) Requester Pays S3 bucket. This service provides knowledgeable users with an option for optimized download or direct access to potentially all of the USGS 3DEP Lidar Point Clouds.

The 3DEP Lidar Point Cloud stored in AWS is currently only available in the open and compressed LAZ format. The USGS is in the process of making all of its Lidar Point Cloud data available in this format and expect for the full set of data to be available by summer 2018.

Accessing the data requires an AWS account and charges are billed directly by Amazon to the user's (or requester's) account. Charges are described in the Frequently Asked Question, How much does it cost to use the lidar Requester Pays option?

For those familiar with the AWS environment the specifics to immediately access the data follow:

AWS Bucket Name: **usgs-lidar (Requester Pays)**
AWS Region: **US West (Oregon)**

The following instructions are provided to help guide those who may be unfamiliar with the AWS environment to better understand and navigate the available options.

Creating an AWS Account

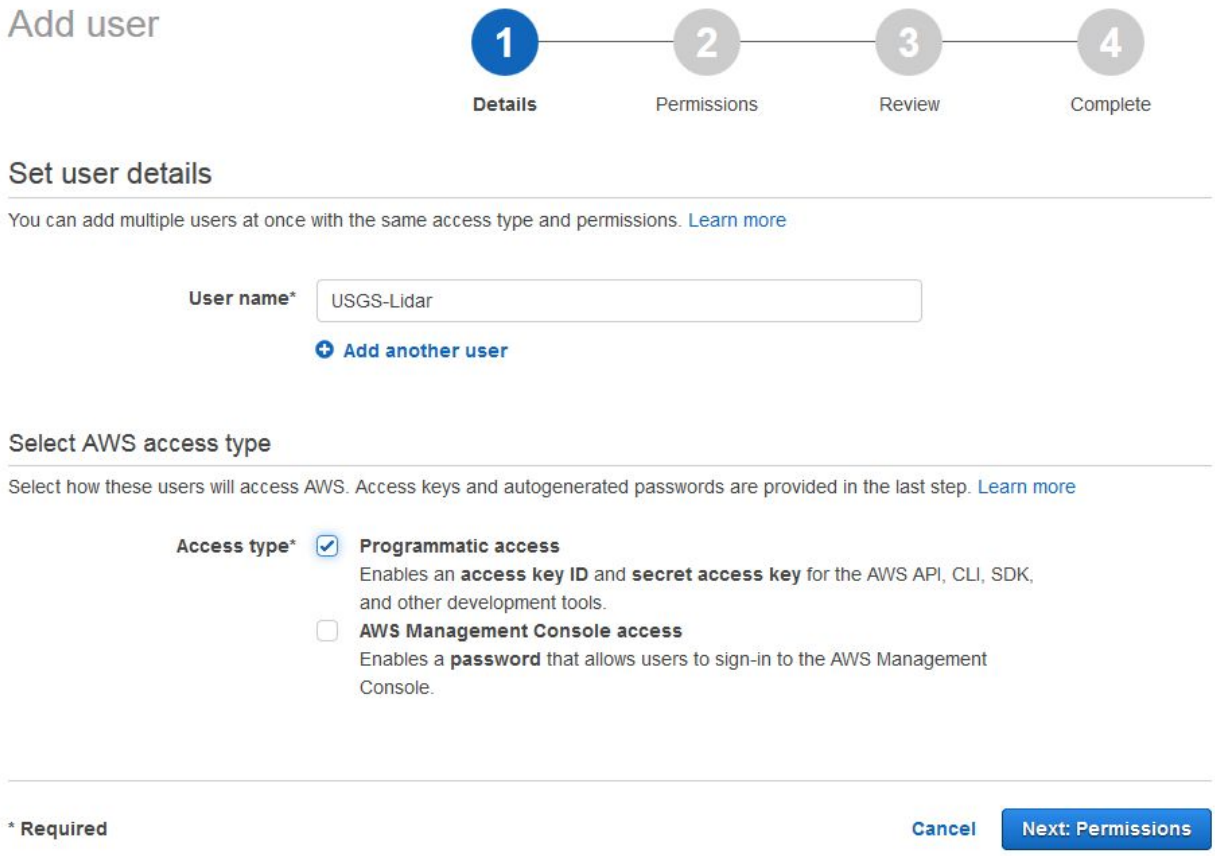
To access the **usgs-lidar** bucket, the end-user **must** create an AWS account at https://aws.amazon.com/free/ so that any charges associated with bucket access can be billed to the requesting individual.

Once an account has been created, the user will need to create one IAM User with access keys which can be used by a number of clients designed to simplify access to the data.

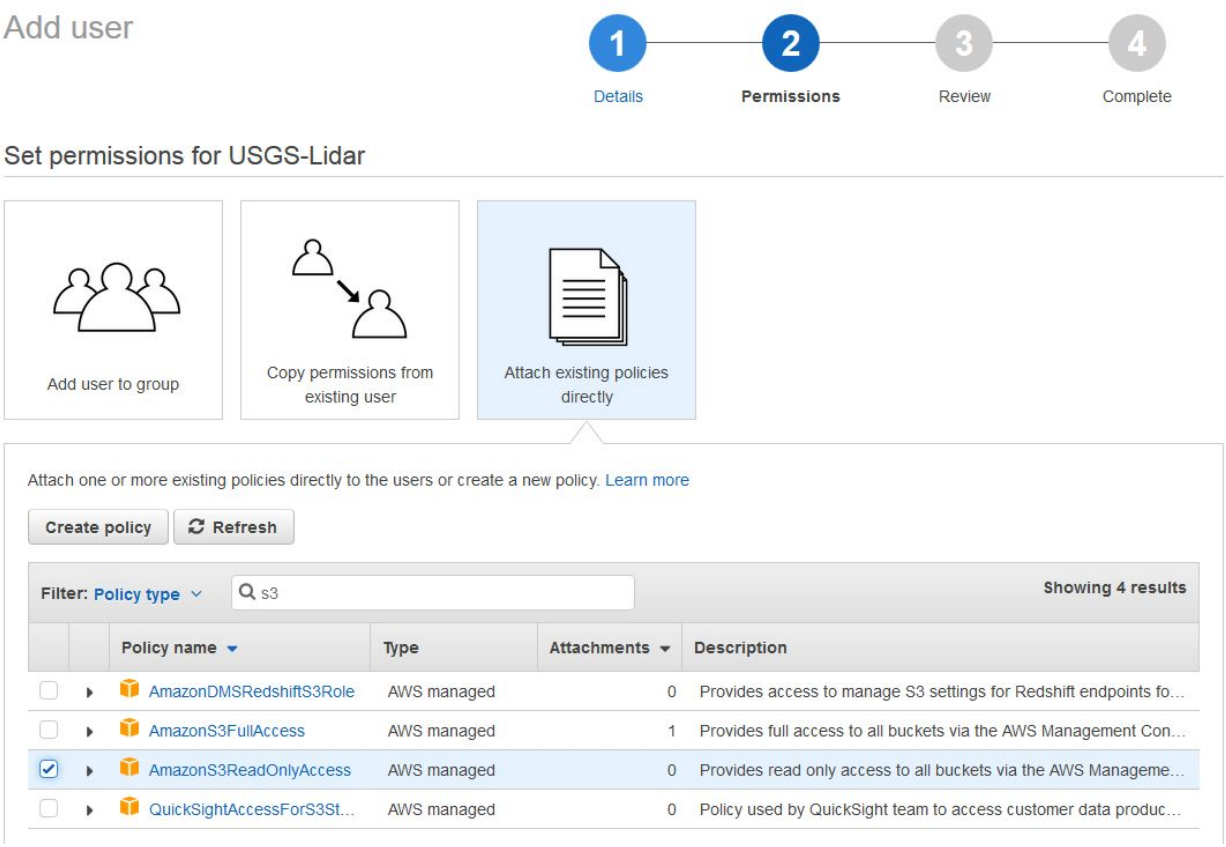
Creating an IAM User Access Key

An IAM user allows specific privileges to be assigned to individual users to customize access to various AWS resources. To access the **usgs-lidar** bucket only requires read-only access to S3 buckets.

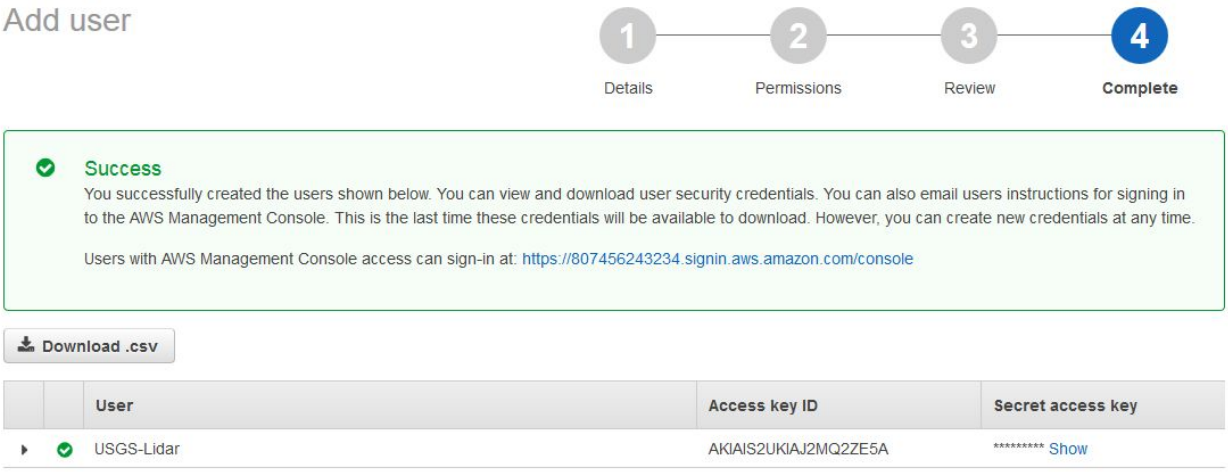
1. Sign in to the AWS Console using your account credentials at https://aws.amazon.com/console/
2. Open the IAM console at https://console.aws.amazon.com/iam/.
3. In the navigation pane, choose **Users** and then choose **Add user**.
4. Type the user name for the new user. For instance: 'USGS-Lidar' and select the checkbox next to **Programmatic access** and click on the **Next:Permissions** button.



5. At the Set Permissions screen select the **Attach existing policies directly** option, type **S3** into the search box, and select the checkbox next to **AmazonS3ReadOnlyAccess.** This is the only permission that is necessary to access the USGS-Lidar data. Click the **Next:Review** button to continue.



6. After reviewing the settings, click the **Create User** button to finish.
7. The next screen should look something like the following:



It is critical that you record in a safe and secure location the **Access key ID** and the **Secret access key** available on this screen. You can also download the 'Download.csv' file which contains this information.
NOTE: After leaving this screen you will not be able to recover this information

Accessing Data via Third-Party Clients

Data found in a requester pays S3 bucket **cannot** be browsed or downloaded directly via a simple URL. It is possible to construct RESTful requests for downloading data without a client. Documentation for doing this type of request is available from Amazon at:

http://docs.aws.amazon.com/AmazonS3/latest/dev/ObjectsinRequesterPaysBuckets.html

However, most users will want to take advantage of third-party clients that simplify access to the AWS S3 Requester Pays bucket. Once configured, the GUI-based clients are similar to the drag-and-drop capabilities found in file browsers like Windows Explorer, and command-line utilities can provide powerful tools for batch processing with batch files or scripts.

Disclaimer: The USGS does not endorse any of the clients referenced in this instruction guide or claim that this list is exhaustive. The following is provided as a sample of the clients available with examples of how to use and is intended to give basic guidance on the steps necessary to configure any client.

AWS Command Line Interface (CLI)

The AWS CLI is freely available on Windows, Mac and Linux platforms. It does not include a graphical user interface (GUI). Instead, commands are typed in a terminal window. AWS CLI is a powerful tool for batch processing and script-based workflows.

Documentation including installation instructions are available at https://aws.amazon.com/cli/.

Once installed, the AWS CLI can be configured using the **aws configure** command using the **usgs-lidar** IAM user's Access Key and Secret Access Key:

```
aws configure
AWS Access Key ID [****************TLYA]:
AWS Secret Access Key [****************o5AY]:
region name [us-west-2]:
Default Default output format [html]:
```

If the configuration is correct the following command will produce a directory listing of all the Lidar Projects.

```
aws s3 ls s3://usgs-lidar/Projects/ --request-payer requester
```

Similarly, the LAZ files within a Lidar project directory can be listed with the command:

```
aws s3 ls s3://usgs-lidar/Projects/PR_PuertoRico_2016_LAS_2017/
--request-payer requester
```

To retrieve a file the command would look something like this:

```
aws s3api get-object --bucket usgs-lidar --key
Projects/PR_PuertoRico_2016_LAS_2017/USGS_LPC_PR_PuertoRico_2016_19QGA59503600_
LAS_2017.laz USGS_LPC_PR_PuertoRico_2016_19QGA59503600_LAS_2017.laz
--request-payer requester
```

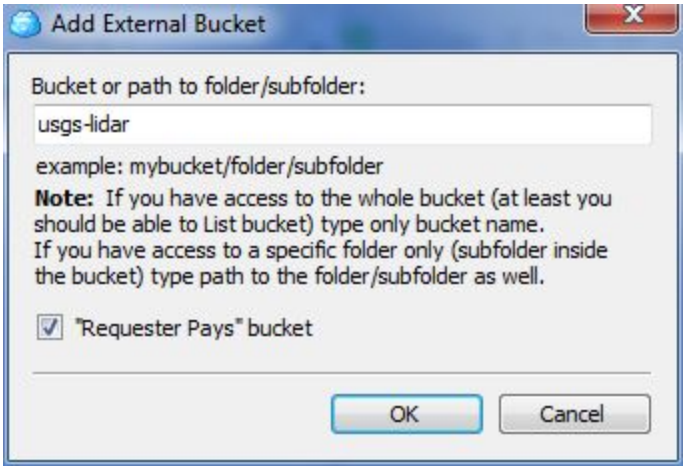
CloudBerry Explorer

CloudBerry Explorer is a Windows client that interacts with Amazon S3 requester bucket. Both free and Pro ($39.99) versions are available at: https://www.cloudberrylab.com/explorer.aspx

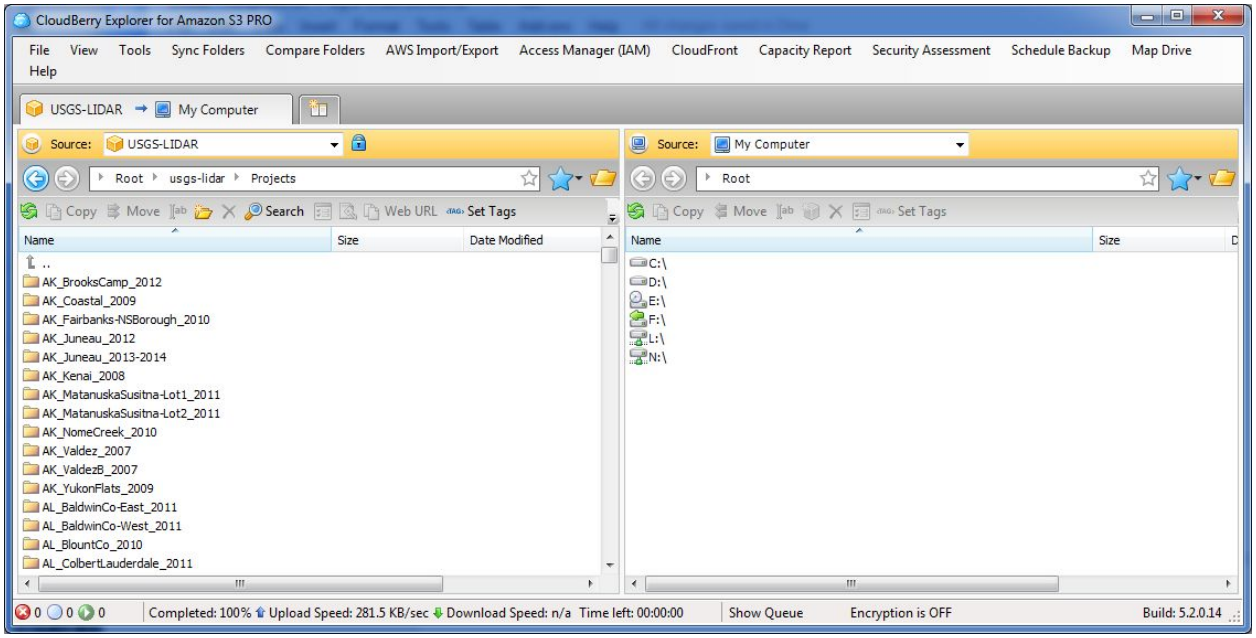
Once installed, the following steps are used to configure the client for accessing the **usgs-lidar** requester pays bucket.

1. File Add New Amazon S3 Account

2. After making a connection to USGS-LIDAR, click the External Bucket icon  to create a path to the **usgs-lidar** bucket.



You can now use CloudBerry like you would a normal File Explorer to browse and drag and drop files to your computer.



S3 Browser

The S3 Browser (https://s3browser.com/) is a free (for personal use) Windows client. The Pro version is available for $29.95 (for business and government use).

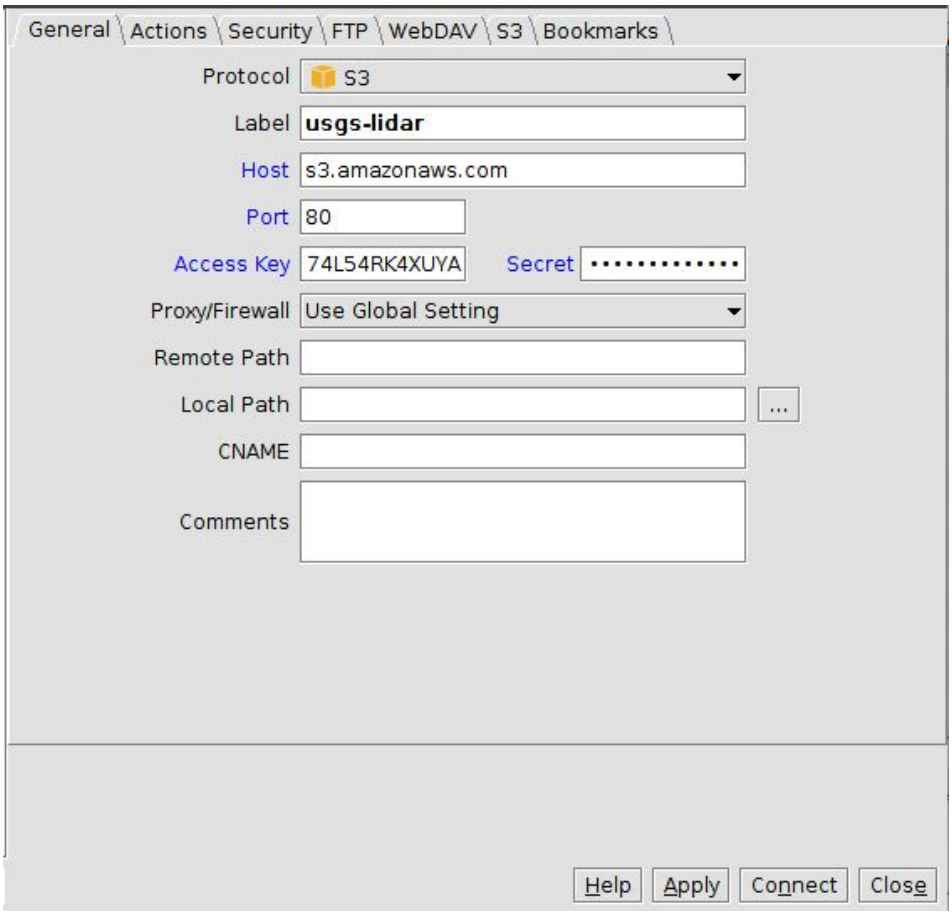
Specific instructions for using S3 Browser with an external user pays bucket can be found at: http://s3browser.com/requester-pays-buckets.aspx

CrossFTP Pro/Enterprise

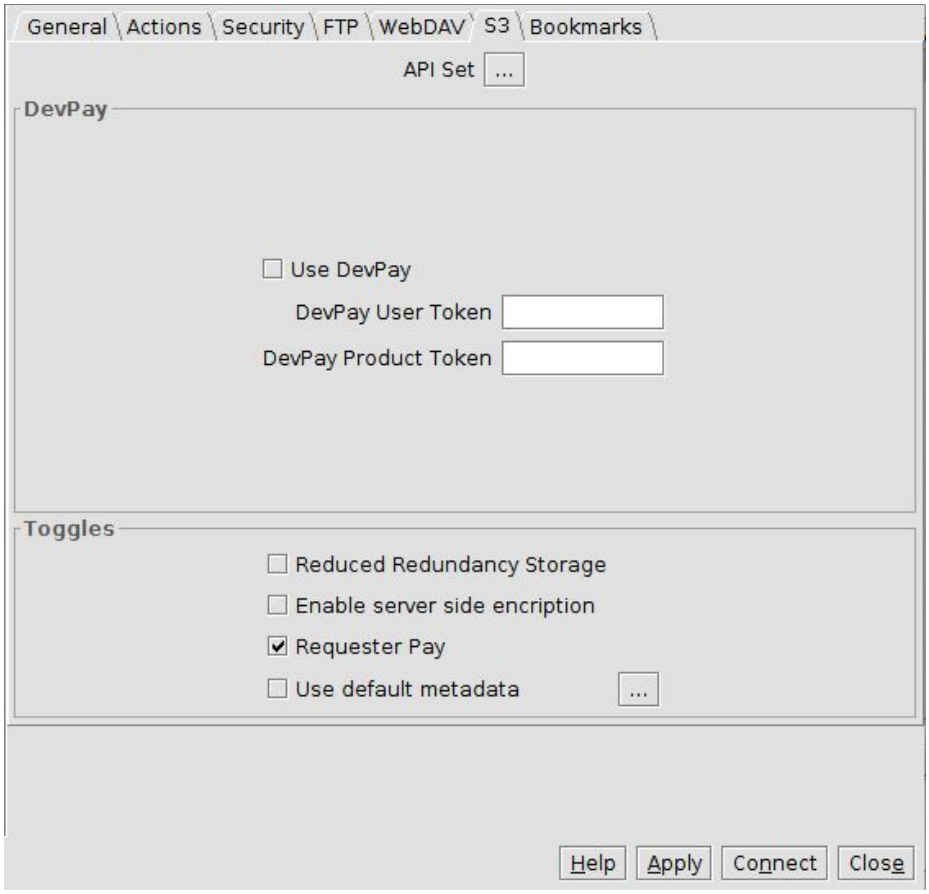
The CrossFTP Pro/Enterprise client is available for $24.99 and runs on Windows, Mac and Linux platforms. The free version does not support Requester Pays bucket access.

Basic Steps for Configuring:

1. Create a new Site and choose Protocol as S3/HTTPS, or S3, and fill in the Access Key and Secret Key.



2. Click the S3 tab and make sure the Requester Pays checkbox is selected.



3. Click the Apply button and Close to save the settings.
4. Double-click the **usgs-lidar** connection.

Specific instructions for configuring CrossFTP Pro to access S3 can be found at http://www.crossftp.com/amazon-s3-client.htm.